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ABSTRACT

This paper examines the process of constructing a student-centered World Wide Web site and provides recommendations for improving this process. In the project, preservice teachers instructed the fifth grade students about how to design and develop a Web site on weather. The topics of the sessions included Internet ethics, using the Web, pre-planning and storyboards, and Web site construction. The project modeled the use of the Web in conjunction with classroom instruction. The goals of this project were to build a student-centered Web site; to use technology to reinforce instruction; and to provide students and teachers with a curriculum-based Web site that is a useful and relevant resource. The paper includes six chapters: (1) "Introduction"; (2) "Background" including unproductive roles of technology in the past, barriers to use of technology; educational applications of the Internet, the World Wide Web, advantages to building student-centered Web sites, cooperative learning, collaboration methods for Internet projects, evaluation methods, Web page design, and HTML (HyperText Markup Language); (3) "Purpose and Rationale" of use of technology in instruction; (4) "Method" of the project, which consisted of tutoring a small group of eight students about the process so that they in turn could eventually teach their classmates; (5) "Evaluation Methodology"; and (6) "Summary and Conclusions." Appendices include: a list of components in a complete storyboard, Weather Wizards Website, Interview questions for participating students and Interview questions for Inservice teachers. (Contains 24 references.) (Author/JAK)

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ED 416 831

Building Student-Centered Web Sites in the K12 Classroom

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Abstract

This project models the use of the World Wide Web in conjunction with classroom instruction. The goals of this project were (a) to build a student-centered Web site, (b) to use technology to reinforce instruction, and (c) to provide students and teachers with a curriculum-based Web site that is a useful and relevant resource. The evaluation of this project assesses the extent to which the project goals were met. Additionally, it examines the characteristics that either enhanced or created obstacles to implementing technology in student learning and provides recommendations for improving this implementation process.

CHAPTER 2: BACKGROUND

Introduction

In the K-12 classroom, technology as an educational tool has the potential to provide students with meaningful learning experiences that extend beyond the traditional classroom setting. According to David H. Jonassen (1995), the most productive and meaningful uses of technology engage learners in knowledge construction, not reproduction; conversation, not reception; articulation, not repetition; collaboration, not competition; and reflection, not prescription. Wilson and Marsh (1995) suggest several reasons why schools should use technology in instruction. Technology creates the opportunities for students to do meaningful work, to increase their knowledge base, to enhance their thinking and writing skills, and to be globally aware, using sources of the "real world" outside of school.

Unproductive Roles of the Past

Using computers in the classroom to achieve all of these goals is contingent upon the instructional roles of both educators and computers. In order to realize how computers can be effectively used in the classroom, one must examine the unproductive roles educators have given technology in the past. These roles often are that of a baby-sitter, entertainer, and drill sergeant (Green, 1995). Teachers have such a hectic and stressful schedule that sending students to work on computers often frees up teacher time. Typical of the entertainment mode is the classroom where a student who finishes his/her work on time is rewarded with extra computer time, playing games that are often of dubious educational value. When the computer is used as a master drill sergeant, students are forced to practice skills in isolation, pressing keys as they venture through an instructional obstacle course (Green, 1995).

In all of these roles, the teacher takes a back seat. When the computer is used as a baby-sitter, the teacher is absent. Using the computer as an entertainer suggests that the instructional material offered by the teacher is not interesting or motivating to students, thus it must be "jazzed up" by fancy computer games. If instructional technology is used as a drill sergeant students are forced to become passive learners, always answering questions but never asking them.

The computer is best suited as an instructional tool when the teacher contributes to and monitors computer instruction. More productive roles for teachers are those of the architect and the muse (Green, 1995). As an architect, the teacher is the planner and the builder of the activity, creating symmetry between the experiences on the computer and the instruction in the classroom. "This teacher avoids the dangers that exist when what happens in the classroom and what happens in the computer lab are separate events that never touch each other" (Green, 1995, p.4). As a muse, the teacher knows how to use the software to best enhance their students' learning. Muse teachers view their students as active learners capable of constructing meaning and solving problems of all kinds (Green, 1995). When students become active learners and see the rewards of their own thinking, motivation becomes genuine and intrinsic.

Barriers to the Use of Technology

In order for teachers to become architect and muse teachers and master the implementation of instructional technology, they must first be given the means to do so. If teachers are to master instructional technology, they must have access to training in the curricular application of instructional technology (Green, 1995). Often technology is not used to its fullest potential in our schools because teachers do not have the proper knowledge and

experience to incorporate technology into their teaching. Also, teachers need support from administrators and coordinators, such as their principals, instructional technology coordinators and technology specialists within the school. Direct support can help promote positive teacher experiences and attitudes toward technology use (Fleming et al, 1995). Teachers need support from these individuals to ensure that they have proper access to technology as well as the proper training with the technology.

Along with support and training, teachers need to be involved in decision making from start to finish. Teachers need to feel a sense of ownership and empowerment in the decision making process (Green, 1995). They should have a say in what hardware and software their schools will buy since they (teachers) are the individuals who will be implementing these technologies into instruction. It is also worthwhile for teachers to write mini- proposals to explain what they want and how they will use the technological equipment in their instruction (Green, 1995).

Teachers need to have access to the technology which will be used in conjunction with their classroom instruction. Teachers will not integrate network technology into their instruction until they are given regular and frequent access to the technology (Proctor, 1996). Also, teachers who constantly familiarize themselves with instructional technology are better equipped to interact with students who are using this technology. "Most need time to practice, gain some confidence, and reflect on the power of the network and what it holds before jumping into classroom use" (Black Klingenstein, and Songer, 1995, p. 54).

Internet

Today, vast possibilities offered by instructional technology have long surpassed the word processing and game playing confines of the past. Rather, they encompass a wide range of networking and telecommunication capabilities provided by the Internet. "The Internet is a galaxy of information and communication resources available on-line to more than thirty million users around the world" (Bloom, Partner, Ottawa, and Denholm, 1997, On-line).

Educational Applications of the Internet

Teaching with the Internet can provide students with easy, inexpensive, and immediate access to the world beyond not just their classrooms but beyond their communities and virtually any other existing boundaries (Wilson and Marsh, 1995). Internet access has the potential to "break down classroom walls" and connect students to the rest of the world (Topp, 1995). By integrating the Internet into the curriculum, teachers are able to enrich and extend their existing curriculum.

The Internet enriches existing curriculum by helping teachers do better what they already do within the confines of the existing school structure and schedules (Dyrli and Kinnaman, 1996). For example, teachers can use ordinary e-mail to do a variety of information-sharing activities with distant classes; discussing books, completing surveys, comparing local weather forecasts, exchanging news reports, and sharing local resources (Dyrli and Kinnaman, 1996). The Internet provides access to materials and experiences that could not otherwise be brought to the classroom and provides easy access to the expertise of others. Along with enriching existing curriculum, the Internet helps to extend existing curriculum by providing new experiences that go beyond the limitations of school structures (Dyrli and Kinnaman, 1996).

The various services that are provided by the Internet help to bring immediacy and individualization to students' learning. Teachers can help individualize student learning by selecting from a host of on-line educational experiences. The Internet is an especially useful instructional tool for teachers because it allows them to find up-to-date materials, without leaving the classroom. Such materials include articles, reports, surveys, databases, maps, diagrams, photographs, film clips, and sound bites (Dyrli and Kinnaman, 1996). The Internet offers a variety of network applications such as e-mail, discussion groups, and the WWW (Bloom, et al., 1997). One such Internet tool that has been found to be particularly useful in the classroom is the World Wide Web.

The World Wide Web

World Wide Web (WWW) is the Internet's "browse, search, and retrieve system that brings hypertext/hypermedia to the Internet" (Dyrli and Kinnaman, 1996, p. 66). Hypertext is the linkable words of the Web and hypermedia allows for such things as graphics, sound, and animation. The WWW allow students to navigate through different Web sites around the world. These Web sites contain such things as documents with formatted text, graphics, sound, video, and links to resources at other locations. The WWW in an effective instructional tool because it provides unlimited access to educational resources and helps learners to create knowledge. One such way students can create their own knowledge is by constructing their own instructional Web site.

Advantages to Building Student-Centered Web Sites

Building student-centered instructional web sites augments teaching and learning in a variety of ways. First and foremost, student developed Web sites work to reinforce and

supplement classroom instruction. Student built Web sites allow students to collaborate on projects that are both relevant to educational standards of learning and relevant to their own life and world (Wilson and Marsh, 1995). Accordingly, when students work together collaboratively, they are enhancing both problem solving skills and social skills.

Another advantage to building student-centered Web sites is that it engages students in their learning, thus enhancing students' roles as constructivists. According to David Jonassen (1994), constructivism asserts that learners construct their own reality or at least interpret it based upon their perceptions of experiences. Thus, an individual's knowledge is a function of one's prior experiences, mental structures, and beliefs that are used to interpret objects and events. "Each creates his or her own knowledge as a researcher, communicator, and collaborator on a worldwide network of people and resource" (Wilson and Marsh, 1995, p. 199). Students take an "active" approach to their learning and don't have to rely on traditional methods of learning such as memorization and rote learning. Using the project based instruction on the WWW allows students to take charge of constructing their own knowledge.

Jonassen suggests that a constructivist design process should be concerned with designing environments which support the continuation of knowledge, and provide (a) a meaningful, authentic context for learning and using the knowledge they construct, and (b) collaboration among learners and with the teacher, who is more of a coach or mentor and not a purveyor of knowledge (Jonassen, 1994).

Discovery-based, student-centered Web sites have a "positive impact" on student learning when they are coupled with effective networking environments. Characteristics of effective networking environments include (a) convenient access; (b) multiple connections to

the Internet; (c) an e-mail system among teachers, students, and staff; (d) a variety of functions; (e) equipment and apparatus; and (f) support (Kaye, 1996).

Cooperative Learning

Cooperative learning is not only becoming increasingly widespread in education, but it has also proven to be an effective way for students to develop skills in working with computers and each other (Neal, 1994). According to John Neal's article in Science Scope, the best types of software for cooperative learning include science simulations, databases, problem-solving programs, and computer-based labs. These programs require students to use processing and higher order thinking skills (Neal, 1994). Neal suggests that the best student-to-computer ratio for cooperative learning is no more than four to one (Neal, 1994).

Neal (1994) states that cooperative learning has a purposeful structure based on five basic conditions, all of which are interconnected and require thorough planning to succeed: (a) interdependence; (b) individual accountability; (c) heterogeneous grouping; (d) shared responsibility for each other's learning; and (e) good working relationships between group members.

Each member of the group must rely on one another. In fact, specifically working in groups on computers prepares students for today's business environment in which team work is essential (Neal, 1994). Cooperative learning practice has increasingly shifted toward project-based or active learning, in which students work together to produce reports, projects, experiments, etc. (Slavin, 1996). Students must be aware not only of their individual role but also of the job descriptions of every other student in the project (Neal, 1994). Group goals motivate students to help their group members learn. "They (group goals) develop positive

interdependence between the individuals in the group, giving them a reason to cooperate in a meaningful fashion" (Slavin and Stevens, 1995, p. 322).

In an effective cooperative learning environment, students are individually accountable to staying on-task and fulfilling his/her responsibilities within the group. Individual accountability increases the probability that all students will learn and reduces the potential for a "free rider effect", where a student does little and relies on others in the group to accomplish the goal (Slavin and Stevens, 1995).

Choosing software that will keep group members interested and eager to contribute is crucial in encouraging the on-task behavior needed to sustain group learning. Thus, the software chosen should be appropriate for students' age and ability, satisfy learning objectives, and motivate students to learn (Neal, 1994).

According to Neal (1994), heterogeneous grouping is the third condition necessary for an effective cooperative learning environment. Cooperative learning allows for heterogeneity in students' levels of performance, interest, and participation (Shacar and Sharan, 1994). Teachers should strive for as much variety as possible, considering factors such as achievement level, gender, race and ethnic background, computer experience, and problem solving ability (Neal, 1994). Cooperative learning provides the opportunity for all members to contribute to the groups' progress and thereby, maintain standing among their peers. Thus, cooperative learning incorporates both the academic and social interactive dimensions of classroom learning within the same set of procedures (Shacar and Sharan, 1994).

Successful cooperative learning requires shared responsibility, in which students are responsible for each other's learning by sharing their knowledge with the group. Students teaching other students is especially useful when working with computers (Neal, 1994).

Although all of the aforementioned conditions desirable in a cooperative learning situation may be present, Battistich, Solomon, and Delucchi (1993) conclude that, "the quality of group interaction plays the most crucial role in determining the effects of cooperative learning on students" (p. 19). They report that students who had "high quality" group experiences in which group members "were friendly, helped one another, showed concern for one another's welfare, and worked collaboratively" were associated with a more positive classroom environment, increased liking for school, and greater intrinsic motivation (Battistich, et al., 1993, p. 19).

Collaboration Methods for Internet Projects

In his article Teaching Online - Techniques and Methods, Martin Kimeldorf (1995) provides educators with the steps necessary to collaboratively design and build online projects with classrooms all over the world. He recommends five basic steps.

Selecting a Purpose and Method

Reasons for using online learning in the curriculum can range from simply demonstrating the relationship between technology and learning to integrating learning into a larger community. Teachers and students must first decide what type of project they would like to construct, which online source they will gather their information from, and what the final product will look like. They also need to decide whether to join an existing online project or to create one of their own (Kimeldorf, 1995).

Joint Planning

When two classrooms are collaborating on a project, "precourse discussion needs to take place, and ground rules must be laid out between teachers" (Kimeldorf, 1995, p. 28). Teachers must establish a common goal, decide how often they should stay in contact, and what the target dates for the steps in the project should be. They should also assess the resources and time available to them and create a flexible schedule that accommodates everyone involved.

Sustaining the Link as the Project Unfolds

Since most projects evolve over several weeks, the participants in a joint project can potentially lose contact. Thus, consistent communication is crucial in "keeping the link alive" (Kimeldorf, 1995, p. 29) and maintaining a sense of cohesiveness in the project. Students can post online updates, which can be printed and posted in the classroom, explore the locations and related time zones of online participants, and exchange pictures, postcards, and brochures describing their school and community (Kimeldorf, 1995). Additionally, teachers need to update each other about any changes, additions, or suggestions for the project.

Exchanging Products

Since creating a project for an audience can be a motivator for students, sharing the final online product is an exciting step in this process. Not only may students share their projects, but they also have the opportunity to receive feedback on their work from an online audience. Through online feedback, such as e-mail messages, electronic evaluations forms, and newsgroup postings, students communicate reflective thoughts about other students' work, and learn to consider constructive comments about their own work (Kimeldorf 1995).

Extending the Project

The project can be extended in a variety of affirming ways. Joint projects can be exchanged, discussed in length through an on-line chat, or teachers can arrange a forum in which students offer their critique of the project. Students can use their critical thinking skills to answer reflective questions about the project, including the following:

1. How much effort did you put into this project?
2. What is one thing you'll probably remember about this online project?
3. In what ways is the online part of this experience different from, and in what way is it similar to, other learning experiences?
4. If you were to do this project again, what would you do differently?
5. How would you grade this online project?
6. How would you grade your learning experience? (Kimeldorf, 1995, p. 31)

The answers to these questions can be used to evaluate how a collaborating online project can be improved and applied in other educational ways.

Evaluation Methods for Internet Projects

In 1994, the Research Foundation at New York State University evaluated the success of using telecommunications technologies, and specifically the Internet, along with learner-directed education to increase student access to learning opportunities and to improve the quality of learning and teaching in ten urban sites in the United States (Universal, 1994). The goals of this project were (a) to develop a supplementary multimedia mathematics course and deliver it to students' homes via telecommunications infrastructure at the least possible cost, (b) to develop and pilot a teacher training programs which would prepare teachers to effectively use these

learning and communication technologies, and (c) to provide participating schools with these telecommunication technologies to allow researchers to assess the effectiveness of this learning model on learner achievement.

The Foundation evaluated the achievement of the above goals using both formative and summative methods of evaluation. The formative evaluation component focused on the review, revision, and improvement of the project as it is developed and throughout its implementation. This "feedback-based" evaluation offered suggestions for the project as it unfolded, which were provided through written reports and periodic meetings with project personnel. The formative evaluation was conducted concurrently with project implementation by on-site staff as well as visiting members of the external evaluation team (Universal, 1994).

The summative evaluation component was designed to assess the success of the project in fulfilling its stated purpose - To what degree did the project accomplish its stated objectives and desired outcomes? This "goals-based" evaluation was provided through on-site observations, interviews, analysis of performance, documentation of accomplishments, and assessment of project participants (Universal, 1994).

In summary, the summative evaluation sought to determined success regarding outcomes of the project. Equally important, however, was the formative evaluation, which was vital to providing improvements throughout the project (Universal, 1994). Evaluation of other technology projects that seek to measure the effectiveness of using telecommunications to enhance the students' learning experiences might follow the same evaluating techniques as the aforementioned one's developed by the Foundation.

Web Page Design

A well designed site not only looks appealing, but it also attracts, and keeps, the attention of Web surfers. There are specific components that well designed Web sites and Web pages feature, as well as ones that they avoid. According to Richard Schwier (1996) and Paul Shotsberger (1996), a well designed Web site follows several main guidelines. A strong Web site is predictable, providing viewers with navigational links so he/she can maintain a sense of location within the site. Sites should omit extraneous, redundant, or inappropriate materials and invite interaction from the viewer. Linking and "point and click" interactions are the most common forms. However, a site may also encourage interaction through written viewer responses, question and answer opportunities, or by providing resources, such as templates, for viewers to download. Finally, always take advantage of an opportunity to display class work.

Specifically, Misanchuk and Schwier (1996) and Paul Shotsberger (1996) recommend that Web authors consider the following recommendations when constructing each page in their site. Information on a page should be organized in an easily comprehensible and inviting way. Write short paragraphs, use bulleted items, link only main ideas, and avoid excessive scrolling. Each page should have precise words within headers, titles search engines will be able to capture these key words and as a result, the site will potentially receive more visitors. To avoid excessive downloading time, a page should contain small images. Otherwise, viewers will click out of the site and surf to a site with less waiting time. Lastly, each page within a site should have a common presentation style and should be able to stand alone. A header, title, and contact information should be included on every page.

When these principles of good design are considered the resulting Web site is simple, informational, easily maneuverable, and often well visited. More importantly, if a site is supposed to serve as an educational resource for teachers and students, it must be relevant and useful to them, as well as accessible (Weinstein, 1997).

HTML and HTML Editors

The World Wide Web (WWW) is the Internet's "browse, search, and retrieve system that brings hypertext to the Internet" (Dyrli and Kinnaman, 1996, p. 66). Point-and-click navigation allows students to visit Web sites around the world containing documents with formatted text, graphics, and even sound and video. To use the Web, one needs "Web browser" software, such as Netscape Navigator or Internet Explorer to decode and display hypertext (Dyrli and Kinnaman, 1996).

Hypertext Markup Language, or HTML, is the central component to the World Wide Web. HTML is a text-based language made up of "tags" which act as typesetting codes for Web pages. In the most simple terms, a page on the Web consists of HTML tags indicating where the page begins and ends and where the text appears on the page. Additional tags determine how the text will look and behave when viewed through a typical Web browser. For example, to display some words in bold, one would insert the tag *<B>* before the text and *</B>* after it. Adding the links that are crucial to interactivity on the Web also involves a text command, although this is a little more complicated (*<A HREF=siteURL>text of link</A>*) (Weinstein, 1997).

Although using tagging is the most foolproof way to design a Web page, learning and remembering the tags can be time consuming for teachers to learn and conceptually complex for

some students to comprehend. After all, one must envision the layout of a page while typing text to represent it. The tool that assists with the job of inserting HTML tags is called an HTML editor. The newest of these HTML editors offers WYSIWYG ("what you see is what you get") capabilities. With these programs, the software creates the HTML code automatically as one highlights, drags, and manipulates text and images on the screen (Weinstein, 1997). In theory, one does not have to look at HTML tags at all; but it is important to acknowledge that because most HTML editors are recently created, they do not have all the command capabilities of manual tagging.

There are several advantages, however, of using HTML editors. Editors provide the option to view a page in progress through a Web browser to see what it will actually look like on the Web. Additionally, WYSIWYG editors, such as Claris Home Page, Microsoft Front Page, and Adobe Page Mill have strong potential for school authoring. A Claris Home Page, for example, looks a lot like a word processing document -- a blank page and an icon menu at the top with buttons for changing text and background options, inserting images, and creating links (Weinstein, 1997). Initially, HTML editors are more user friendly for students and teachers who are just learning how to create Web pages.

Conclusion

The potentials of technology in the classroom are still being discovered while educators everywhere are using it in varied ways in the classroom. Hopefully, unproductive roles of technology, such as that of the baby-sitter, entertainer, or drill sergeant, will fade as teachers learn how to effectively integrate technology into instruction. When applied as a tool within instruction, technology has the potential to enrich and extend the curriculum. Students engaged

in technology, and especially with the Internet and WWW, are able to take ownership in their learning process and to create learning opportunities that are relevant to their lives.

CHAPTER 3: PURPOSE AND RATIONALE

Research shows that the use of technology in the classroom as an educational tool helps contribute to a more effective educational experience. "Significant and mounting evidence shows that technology improves students' mastery of basic skills, test scores, writing and engagement in school" (Dwyer, 1996, p.24). Educators are continually searching for new ways to include instructional technologies into the curriculum to create more valuable educational opportunities and experiences for students.

Peck and Dorricott (1994) suggest several reasons why schools should use technology in instruction. Technology creates the opportunities for students to do meaningful work, to increase their knowledge base, to enhance their thinking and writing skills, and to be globally aware, using sources from the real world. Many educators claim that technology is necessary in maintaining high academic standards and preparing students for the world outside of school.

This project models the use of the World Wide Web in conjunction with classroom instruction. The World Wide Web was chosen as the technological tool because of its innovative role of reinforcing and enriching instruction, thus allowing students to construct their own knowledge through virtual experiences (Shotsberger, 1996). The Web site produced in this project was constructed simultaneously with classroom instruction and designed to identify the characteristics that either enhance or create obstacles to implementing instructional technology, specifically the World Wide Web, in student learning.

The evaluation of this project assesses the value of and monitors the effectiveness of using the World Wide Web in instruction. One component of the evaluation includes determining the extent to which the following goals were achieved: (1) to build a student-

centered instructional and interactive Web site, (2) to use technology to reinforce and enrich instruction, and (3) to provide students and teachers with a curriculum-based Web site that is a useful and relevant resource. This paper in particular, examines the process of constructing a student-centered web site and provides recommendations for improving this process.

CHAPTER 4: METHODS

Setting and Participants

This project was designed and implemented within the Technology Infusion Project (TIP) at the University of Virginia. The goal of TIP is for preservice teachers to learn instructional technologies and to collaborate with inservice teachers to integrate technology into the classroom. The project was implemented at Crozet Elementary school in Charlottesville, Virginia. The participants in this project include two TIP instructors, two preservice teachers in TIP, two inservice teachers, and eight fifth grade students.

Crozet Elementary was chosen because it met the characteristics that Judith Kaye (1996) recommends for an effective networking environment. Characteristics of effective networking environments include the following: convenient access, multiple connections to the Internet, an email system among teachers, students, and staff, a variety of functions, and support. The media center of the school allowed for convenient access to all of the technical equipment needed to facilitate this project. Students had access to multiple Internet connections in both the media center and in their classrooms. The e-mail system among teachers, students, and staff made frequent communication possible among all parties involved in this project. The school provided the students and TIP preservice teachers with all functions necessary to complete the project. Such functions included: access to the WWW, digital scanners, printers, and CD-ROM clip art books. Also, TIP instructors and the Instructional Technology Coordinator of Albemarle County Public Schools were available to supervise the distribution and maintenance of software and to offer support.

TIP instructors taught preservice teachers about educational technologies and their uses in instruction. They also contributed their support and advice in the project's design and implementation. For example, TIP instructors advised preservice teachers about the extent to which the technologies used in this project could be explored within the time available for implementation.

The two TIP inservice teachers collaborating in this project were fifth grade teachers at Crozet Elementary school. Both had a particular interest in learning how to construct Web sites and how to teach their students this as well. Because inservice teachers at Crozet are familiar with their students and their abilities, they chose four students from each class to participate in this project. Because of the time element available for this project, the inservice teachers chose students who they believed would stay motivated and on-task during the project, and who would be willing to teach other students in their class what they learned after the project was complete.

There were four boys and four girls, matched into both same sex and mixed sex pairs. Inservice teachers paired these eight students according to how well their individual skills complimented each other. As a result, the cooperative groups selected were diverse with respect to ability, computer competency, and writing skills. While their computer competency varied, all of the students chosen had had some exposure to the Internet prior to this project. Their experiences ranged from using email and chat groups to navigating on the World Wide Web. Several students had access to the Internet at home and used their computers regularly.

Materials

The technologies used for this project were all available in Crozet's library. Students, inservice teachers, and preservice teachers had access to four Macintosh computers equipped with Netscape Navigator 2.0, Claris Home Page 2.0, Graphic Converter 2.06, ClarisWorks 4.0, and a digital scanner. Students also used CD-ROM clip art books, personal illustrations, and library materials as resources for the context and images found in their Web site.

According to John Neal (1994), choosing software that will keep group members interested and eager to contribute is crucial in encouraging the on-task behavior needed to sustain group learning. Thus, the software chosen should be "appropriate for students' age and ability, satisfy learning objectives, and motivate students to learn" (Neal, 1994).

Based on the judgments of TIP instructors, and the preservice and inservice teachers who had just learned Claris Home Page, this software was considered to be the most suitable and accessible for students to use in this Web project. Other equipment, such as Netscape Navigator, was already available in the school's library. Claris Home Page and Netscape are standard softwares installed in classrooms throughout Albemarle County.

Procedure

Collaborating Within TIP

In his article, Teaching Online--Techniques and Methods (1995), Martin Kimeldorf recommends how teachers of classrooms participating in an online project can effectively collaborate to meet with success. Similarly, the Web project at Crozet required a collaborative effort between TIP preservice students and inservice teachers. Preservice teachers instructed students in the library about the technologies involved in the project while inservice teachers

taught the weather unit in the classroom. Thus, preservice and inservice teachers followed Kimeldorf's (1995) five recommended steps for collaboration to create a cohesive atmosphere for student participants.

Step 1--Select a Purpose and Method

Preservice TIP instructors and inservice teachers at Crozet exchanged ideas and decided that they would work collaboratively to facilitate the construction of a student-centered Web site focused around a unit of study on weather. Thus, teachers agreed that the purpose of the project was to teach students how to build Web sites based on the curriculum, and the instructional method used to accomplish this project would consist of tutoring a small group of eight students about the process so that they could eventually teach their classmates. Teachers chose weather as the unit topic because both agreed that integrating technology into the current curriculum would increase the project's relevancy.

Step 2--Joint Planning

Preservice and inservice teachers decided how often they would stay in contact, and what the target dates for the steps in the project would be. In this project, inservice and preservice teachers met once a week so preservice teachers could instruct inservice teachers on the technologies involved in the project. Ideally, ongoing instruction for inservice teachers would remain one step ahead of the instruction given to the students involved in the project. This would allow teachers to assist students if necessary.

Prior to working with the students, the teachers created a timeline for the project which included the objectives for each instructional session. Student goals for the project were updated weekly and reviewed during the weekly inservice meeting between teachers. Inservice

teachers determined that the unit of focus for the Web site would be weather because this was the next unit they would both be covering in their fifth grade curriculum. Inservice teachers chose subtopics within this unit that satisfied not only the Albemarle County curriculum, but also the inservice teachers' desired learning outcomes for the unit.

Step 3--Sustain Communication as the Project Unfolds

Preservice and inservice teachers in this project maintained communication during the implementation of the project. They informed each other about changes in or problems with the project, via email, inservice meetings, written correspondence, and phone conversations. Furthermore, preservice teachers elicited the aid of TIP instructors and kept them informed by submitting weekly progress reports.

Step 4--Share and Evaluate the Final Product

In this project, students shared their work by posting their Web site on the Virginia's PEN server and sharing the site with the rest of their class. At the conclusion of this project, preservice and inservice teachers shared their evaluations of the project's procedure and product. In both formal and informal interviews, inservice teachers discussed what they felt were the strengths of the project. They shared their thoughts on how they could use the student-centered Web site to further enrich the weather unit and to present to the entire class a new way of approaching a unit of study.

Step 5--Extend the Project

Preservice and inservice teachers extended this project in a variety of affirming ways. Together as a class, students at Crozet planned to continue revising and updating their weather

Web site. Inservice teachers planned to use this project as a model for developing other online projects.

Project Implementation

Preservice teachers instructed the fifth grade students for an hour and a half a week for eight weeks. The instruction was broken down into two forty-five minute sessions every Tuesday and Thursday morning. Both preservice teachers instructed four students per session. Approximately four weeks were devoted to instructing students about how to design and develop their Web site on weather. The remaining four weeks were comprised of assisting students in putting their site together. The topics of the instructional sessions included (a) Internet ethics; (b) project introduction; (c) using the World Wide Web; (d) Claris Home Page; (e) pre-planning and storyboards; and (f) Web site construction.

Internet Ethics

Initially, preservice teachers assessed students' knowledge of the Internet. Through discussion, preservice teachers learned how much and what types of prior experience students had with the Internet and with computers in general. They identified the perceptions and misconceptions students had about the Internet and the World Wide Web.

The first session concluded with informing students about Internet ethics and Albemarle County's policy for acceptable uses of the Internet. Throughout this session, preservice teachers defined terms that were mentioned in the conversation, such as online, email, server, Internet, URL, WWW, and browser.

Project Introduction

Students were introduced to the project and its desired outcomes. Preservice teachers described the project as a content-based Web site that would serve as a resource for students and teachers from everywhere. Thus, the students' goal was to build a site that reflected what they were learning about weather in their classrooms. Ideally, the site would not only provide information, but would also contain an interactive component. In providing an interactive element, such as a quiz or an instructional activity about weather, other students and teachers have a reason to continue visiting the site.

Students were also given a general overview of the target dates for the project. Throughout this orientation, preservice teachers stressed that student feedback about any aspect of the project was encouraged and invaluable to the project's evaluation.

To demonstrate more clearly what the project entailed, preservice teachers showed students a model of an instructional Web site on Ancient Civilizations and the storyboard for that model. Storyboards were presented as crucial elements in the project because they would serve as the "blueprints" which students would follow in building their site.

Using the World Wide Web

For the purpose of this project, students used the WWW to gather information about their particular weather topics and to find sites to which students wanted to link their pages. In the several instructional sessions following, preservice teachers used whole group direct instruction followed by individual guided instruction to teach students about navigation, net searches, and Web page design.

Navigating on the WWW.

The ability to navigate on the Web depends on two main components - the menu options in Netscape, such as "Back", "Forward", and "Go", and the options provided within a Web site that the author intentionally provides. Students were given several bookmarked sites to navigate through. As they explored these sites, preservice teachers prompted them with questions about how easy or difficult they felt it was to navigate through certain sites.

Conducting Web searches.

In searching on the Web, students were given two search engines to use, Yahoo and Alta Vista. The former was chosen because it was most familiar to students, and the latter was chosen because of its capability to use a grouping system similar to Boolean logic. Boolean logic allows for the use of key words with "and-or" terminology to locate more specific information. In Alta Vista, quotation marks group key phrases and addition signs serve the same function as the word "and" does in linking words together for a search. Each pair of students performed sample searches on Netscape to look for possible sites about their weather topics. They worked in pairs so they could generate more synonyms to narrow their search.

Good Web page design.

Preservice teachers prompted students with questions about the elements of well designed Web pages as they searched for sites. Questions included:

1. What do you like or dislike about this site? Why?

2. How predictable is this site? For example, do you have a picture in your mind about your "location" within the site?

3. What characteristics do the sites you like and dislike have in common (i.e. font, text layout, navigation link options, color, graphics)?

Students also viewed three formats for a table of contents or menu page and determined which format they thought organized information in an easily understandable and accessible way. An explicit menu contains items in a numbered or bulleted list and each item is a link to more information on that topic. An embedded menu consists of these same linkable items embedded within bulleted sentences that briefly describes the link. A third menu format contains linkable words throughout paragraphs in a block of text, rather than displaying bulleted or numbered lists. Of the three format options, students unanimously chose to use explicit menus in their sites.

Claris Home Page

Direct instruction followed by hands-on lab time was the instructional method used to teach students how to use Claris Home Page. Preservice teachers briefly pointed out the following functions that students would use to build their Web sites: (a) changing text size and color; (b) changing background colors; (c) inserting images, tables, and horizontal rules, and (d) inserting local and external links. During these two sessions, students practiced using Claris Home Page by creating a sample home page about themselves. During the lab time, preservice teachers provided individual instruction as students asked questions. For example, if a student was prepared to insert an image, preservice teachers showed him/her how to retrieve one from a clipart CD-ROM or library and insert it into their page.

Preplanning and Storyboards

Prior to planning their specific sites on their weather topics, preservice teachers reviewed the storyboard--what needed to be included on it, and what elements of good design they needed to consider in their plan. Visual aides of this information were given to each inservice teacher (see Appendix A). One week was set aside (no instructional sessions) for students to research their topics, design their sites, and make their storyboards. Inservice teachers were primarily responsible for guiding and assisting students in the content included in their pages. Thus, during this week students collaborated with their teachers and each other in making their storyboards. Students gathered information for their sites from the instruction they received in class, from activities done in class, and from library resources.

Web Site Construction

During the session immediately following this week, each pair of students shared their storyboards with the preservice teachers to finalize any additions or changes that were needed before they began constructing the sites. Over the next four weeks, students, with the assistance of the preservice teachers, constructed their Web sites. (see Appendix B for a print out of the Web site).

CHAPTER 5: PROJECT EVALUATION

Evaluation Methodology

The evaluation of this project will provide inservice and preservice teachers with recommendations and suggestions about how they might implement a similar technology project in their classrooms. This evaluation focuses primarily on the strengths and weaknesses of the project's implementation as a whole. The components of this project's evaluation are (a) student evaluation, (b) inservice teacher evaluation, and (c) designer evaluation (by preservice teachers). Within these components are formative and summative methods of evaluation. The formative evaluation methods provided feedback based information used to adjust and improve the project during its implementation. Summative evaluations measured the degree to which the following projects goals were achieved: (1) to build a student-centered instructional and interactive Web site, (2) to use technology to reinforce and enrich instruction, and (3) to provide students and teachers with a curriculum-based Web site that is a useful and relevant resource.

Student evaluations of the project were assessed in individual interviews at the close of the project. Students discussed their thoughts about (a) the accessibility of the WWW, (b) the educational purposes of the WWW, (c) the user friendliness of Claris Home Page, (d) the value of technology as a tool to enrich the curriculum, (e) the value of their weather site as an educational resource for other students and teachers, and (f) the cooperative learning environment (see Appendix B for the full list of interview questions).

Inservice teachers' evaluations of the project were also assessed through post-project interviews. These interviews focused mainly on teachers comments about (a) the value of

technology as a tool to enrich the curriculum; (b) the value of the students' weather site as an educational resource for other students and teachers; and (c) how they plan to structure instruction for Web projects in their own classrooms and to extend this project (see Appendix C for the full list of interview questions).

Preservice teachers used both formative and summative evaluation methods to determine the extent to which the project goals were met. Preservice teachers wrote journals discussing each instructional session and observed the instructional needs of students during implementation in order to adjust instruction accordingly. They interviewed students (in groups of four) twice throughout the project to receive feedback about the clarity of their instruction and the students' attitudes toward the project. On-going observations of and conversations with students during project implementation also gave preservice teachers a sense of the strengths of the project and of the areas that need improvement. Preservice teachers considered all methods of evaluation (journals, interviews, and on-site observations) when evaluating the success of the project.

Student Evaluation

Accessibility of the WWW

Most of the students agreed that using the WWW was "pretty easy" overall once they were able to practice moving through it. No students reported that the WWW was difficult to use however, one student noted that it was "boring to wait for downloading" and another said, "Sometimes we wouldn't get what we were looking for and it was a little frustrating." These comments were common throughout the rest of project implementation as well.

As with most technology applications, downloading often takes what seems to be a long time. Preservice teachers observed that students were often anxious when waiting for downloading and eventually became frustrated with the WWW. Students also experienced frustration when Web searches presented them with too many or too few matches.

Educational Purposes of the WWW

All of the students agreed that the WWW was good place to get information. One student stated, "You can look for information on it and it gave a lot more information than you can get in just a library or at home." Some students reported that they used the WWW to help them with their homework because information was easier to find on the Web than in their books. Another aspect of the WWW that students identified as educational was it's ability to be interactive. The students liked that the WWW allowed them to respond as well as receive feedback in an interactive way.

User Friendliness of Claris Home Page

Claris Home Page seemed to be an easy software for students to use. A student reflected, "I thought it (Claris Home Page) was great because it wasn't confusing. The buttons told you what the functions were and it was easy to put graphics on." Most students felt comfortable using Claris Home Page once they were instructed on how to use it and then given the opportunity for hands-on practice.

Two students felt that Claris Home Page would be even easier to use if it were modeled more after the ClarisWorks word processing and paint/draw programs. They agreed, "You can't draw in it and its limited, if you want any pictures you can't just do it right there with the Claris Home Page." It was difficult for students to realize that text and pictures couldn't fit

anywhere on the page and that they couldn't select the item and move it where they wanted, which is possible in ClarisWorks.

Value of Technology as a Tool to Enrich Curriculum

All but one of the eight students agreed that the Web project helped them to better understand what they were learning about weather in class. Most students felt that they had to learn the information they were presenting on their pages well. Also, some students felt that their learning went beyond their classroom instruction because they used other resources to gather their information. One student commented,

> The Web project made learning more fun because we got to use the information we had. A lot of times teachers teach us stuff and we just forget it because they (teacher) don't do anything with it again. I liked doing the Web project because it gave me a reason to remember what I learned because I had to put it on the page.

Value of Site as an Educational Resource

The students thought that their site would present information in a way that would be easy for others to understand. They felt there was a good balance between the content, pictures, and activities of the site which would help to keep the readers' attention. For example, one student felt that the weather chart would be useful for others to use. She said, "You don't want to just read all about this; this is actually a way that you can try to forecast the weather." Thus students felt that the site provided useful information as well as interactive opportunities that were relevant for learning the material.

Cooperative Learning

All students agreed that working with partners was necessary because of the wide range of information covered in project. One students stated, "I think it would have been a lot harder to do this project by myself because we split up the work and did it evenly. Had we not split up the work, I would have had to do all of the work and it would have taken a lot longer."

However, there were conflicting opinions about the working relationships among certain members of the groups. The two pairs who chose their own partner seemed to work well together and appreciate each other's opinion. A student commented, "I liked working with a partner because the partner would help you correct stuff and decide on things -- we had to decide on things together equally."

On the other hand, the two pairs who were assigned their partners did not think that their cooperative relationship worked well. One students said, "We got on each other's nerves and argued all of the time. It was frustrating because she always took control over the ideas." These two pairs of students felt that their ideas were not always represented and that having a choice was not always evident because they were working with a partner with whom they did not get along.

Inservice Teacher Evaluation

Value of Technology as a Tool to Enrich Curriculum

Both teachers agreed that the project helped enrich the curriculum for the students. One teacher felt that the extra work and research involved in creating the Web site gave the students a better understanding of what they were learning about weather in class. She stated, "It gave

students a deeper understanding of the material because they had to come up with good definitions and explanations for someone else to understand."

The second teacher involved in the project felt that her students had enjoyed doing the work for the project and at the same time they had learned a new skill. She responded, "I think they've enjoyed it and learned a lot. They feel a certain amount of proficiency, they've got that feeling that they've learned how to do a certain skill and its something they could teach other people."

Value of Site as an Educational Resource

Both inservice teachers felt that the weather site would be a useful resource for other students and teachers. One teacher commented, "This site is useful because it has kid-friendly information and also shows your class what other kids are doing. It is informational and gives teachers ideas of what they can do." They hoped that this site would serve as a model and "motivational tool" for other classes around the country to participate in projects similar to this one. Both teachers felt that since students had created the site, other students would become interested in exploring the site and similar educational sites, as well as become interested in creating their own sites.

Structure of Instruction and Extension of Project

Both teachers agreed that they would use small groups to teach this kind of project in the future. One teacher said, "I would do small groups and have the students be mentors for the other students." They also felt that they would need extra help from resource teachers or volunteers because of the scope and depth of this type of project. "I'd like to have the technology and gifted coordinator to help me out. I could not do it as a whole class, especially

because of those students who are not proficient with the computer." It is clear that this teacher intended to not only use a third adult to assist in instruction, but also to empower her students through peer teaching.

The teachers felt that the project was a good learning tool. One commented, "I think its another way to show what they know." They said they would assess this type of project using their own criteria. One teacher thought that appearance and content should be evaluated separately. The other teacher said she would evaluate the project based on the following five criteria: research, demonstrating an understanding of material, following directions, showing creativity, and meeting expectations.

Designer Evaluation

The designer evaluation conducted by the preservice teachers explored some of the problems faced in implementing the project, suggestions for what would have worked better, and concludes with recommendations for improving future projects.

Problems and Suggestions

The project was delayed a few sessions because preservice teachers had to wait for Claris Home Page to be installed on the school computers. Since there was a limit to the number of computers which could accommodate the software, the number of students who could participate in the project was also limited.

Throughout project implementation, preservice teachers encountered frequent and unpredictable problems with the technology aspect of the project. Due to unstable Internet connections, the students were unable to use the computers at all during the first two sessions. Without the Internet connections, students did not have access to the WWW. Consequently,

students did not receive adequate time browsing and searching the Web. Students would have benefited from more time searching exploring the different sites because they could have focused on Web page design and gathered ideas for their own Web pages. Internet connections are hardly predictable aspects of technology, however if preservice teachers had been able extend the project, the extra time would have been beneficial.

Perhaps the biggest consumer of time in this project was the storyboard. Students had a week to complete their storyboard, yet due to miscommunication between TIP inservice and preservice teachers, some students did not have complete storyboards before they began building their sites. These students had a more difficult time designing their pages because their ideas were not completely organized and written out.

Although preservice teachers encountered specific problems throughout the project, preservice teachers felt that student and teacher attitudes toward the project, as well as their own observations and assessments prove that the project was an overall success. All components of the project met the three project goals: (a) to build a student-centered Web site, (b) to use technology to reinforce instruction, and (c) to provide students and teachers with a curriculum-based Web site that is a useful and relevant resource.

The eight students successfully designed and built their own student-centered Web site. Students quickly mastered the technologies involved in building a Web site. Judging by student reactions toward the "user-friendliness" of Claris Home Page, the technology seemed to be easy for students their age to use and a fun way to show what they had learned. Also, one teacher commented that she felt her students were proficient in the technological skills

necessary to build a Web page and that her students would enjoy teaching someone else how to build Web pages. Of course, the best evidence that this goal was met is the actual site itself.

The technologies used in this project helped to reinforce instruction by helping create valuable opportunities for students to show their knowledge and understanding of the material. Students demonstrated their understanding of the material in different ways and offered explanations of the material presented in their site. For example, students included pictures, interactive quizzes and activities, text, and links to related external sites within their portion of the weather site.

Both the students and the teachers felt that they (students) knew their weather topics well because they conducted research outside of the class instruction. When building the site, the students constantly considered the audience of their site and made sure they included accurate, yet interesting information regarding their topic. The students wanted to make a project that other people would find informative and enjoy visiting.

The Web site itself is a wonderful resource for other students and teachers. The entire site is grounded in weather curriculum and meets the Virginia Standards of Learning for fifth grade science. Because the students used a variety of techniques to reflect what they had learned, their site is appropriate for learners of all styles and abilities. As noted by one teacher, the site is very "kid-friendly" and is a welcome change from the standard textbook.

Teachers will find the site informative and fun, as well. The students included multiple activities that teachers can easily incorporate into their instruction. The site can also serve as an effective motivational tool for teachers to show their classes how other kids are applying their knowledge.

Recommendations

One of the main purposes of this project was to provide inservice teachers with recommendations about how to facilitate the construction of student-centered Web sites in their classrooms. Although technology can be confusing and inaccessible at times, the responses from students participating in this project show that integrating technology into the curriculum can motivate learning. More importantly, students feel ownership in the learning process and are curious to learn more.

Based on the findings in this project, inservice teachers may want to follow these guidelines when implementing a Web building project:

1. Allocate more time. There are always setbacks in working with technology but none that can't be overcome with a little flexibility.

2. Teach effective search strategies. Give students effective ways to narrow their searches on the Web. This will ease frustrations among students and allow for more productive searching time.

3. Require detailed storyboards. The storyboards provide students with a conceptual model of how a Web site fits together. Furthermore, having the pages of a site designed before one begins to construct them saves time at the computer and eliminates confusion among students.

4. Balance content and design. Be aware that students must first master the skills needed to build a Web site before they can design an instructional site with challenging content. Allow for plenty of practice with each skill (i.e. searching, making links, inserting pictures, etc.), and

emphasize content and design as equally important components in the site. Remember, technology is the medium through which meaningful activities are constructed.

5. Clarify all participants' roles. Give everyone a written "list of duties". This is particularly important if classroom teachers are collaborating with technology specialists, volunteers, or anyone who pulls students outside of class for technology instruction. Ideally, classroom teachers instruct both technology and the curriculum, while a technology specialist or volunteer supports. As a result, technology instruction is not presented to students as a separate subject , rather it is smoothly integrated into the curriculum.

CHAPTER 6: SUMMARY AND CONCLUSIONS

This Web project is a model demonstrating how inservice and preservice teachers can effectively implement instructional technology in their classrooms. Implementing instructional technology means using technology as a tool to enrich and extend the curriculum, rather than using technology as a supplemental resource. Preservice TIP teachers instructed and guided eight students in creating a student-centered interactive Web site centered around weather. Over a period of eight weeks, students worked cooperatively to create a Web site that provided other students and teachers with a useful and relevant resource. This project succeeded in meeting these goals and perhaps more importantly, it provided participating students with enriching and motivating learning experiences. Inservice teachers agreed that this project motivated student students and increased their initiative in and ownership of the learning process.

In conclusion, teachers have the ability to use technology to enhance learning and teaching opportunities in classrooms all over the world. Specifically, the Internet and the World Wide Web are revolutionizing student and teacher roles in the classroom and are broadening their perspectives as well. Educators should welcome the expansion of technological resources available to their schools, and take advantage of their potential use in becoming an integral part of instruction.

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Appendix A

The following were listed on the visual aides as required components in a complete storyboard:

1. Write out all content and design text layout.
2. Have pictures ready to scan, clipart chosen, and/or illustrations drawn.
3. Bookmark or record external sites desired as links.
4. Include navigation options at the bottom of each page.
5. Draw all links between pages on the storyboard.

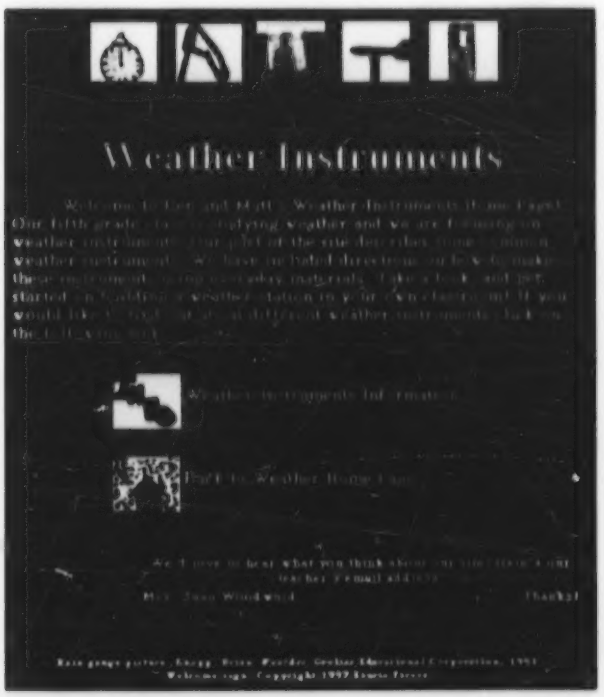
The recommendations for good Web page design, given by Shotsberger and Schwier, were also taken into consideration when students designed their Web site. The visual aide on "Good Web Page Design" summarized these suggestions into the following points:

1. Keep it simple.
2. Explicit menu.
3. Navigation options at the bottom (icons are ideal).
4. Limited scrolling.
5. Be consistent.

Appendix B: Weather Wizards Web Site

This is a portion of the weather site students constructed in this project, including the main home page and the first page for each weather topic (weather instruments, clouds, forecasting, and weather maps.

Weather Wizards
This site was built by eight fifth grade students at Crozet Elementary School in Charlottesville, Virginia. The information and activities contained in this site are a reflection of their class instruction and their own research on weather topics within their curriculum. Student authors hope that their site will provide other students and teachers with ideas and resources for their classrooms.
Weather Home Page
Weather Instruments
Clouds
Forecasting
Weather Maps
Teacher Resources
This project was designed and implemented within the Technology Infusion Project (TIP) at the Curry School of Education at the University of Virginia. Preservice teachers, Allison Hall and Brigitte Durie, guided students in building this site. Please email us with your comments:



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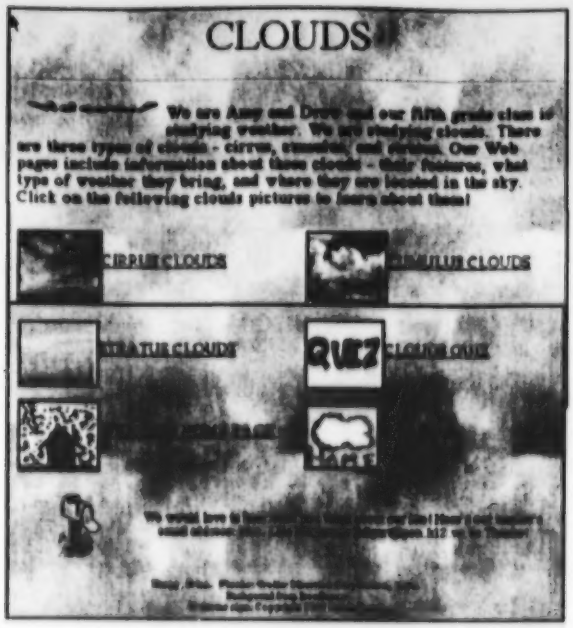
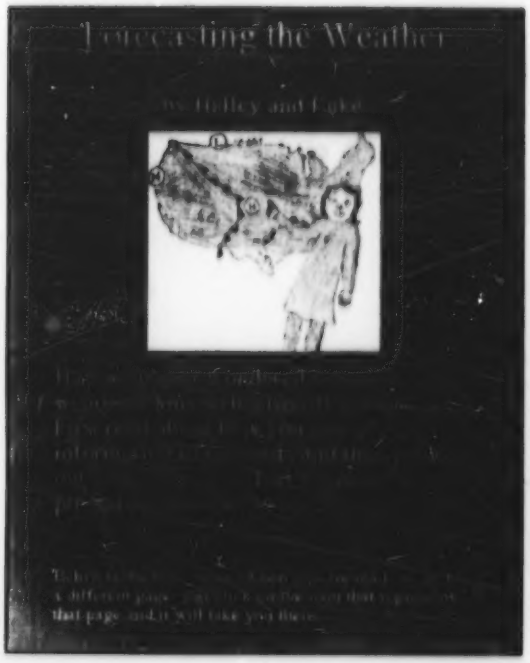
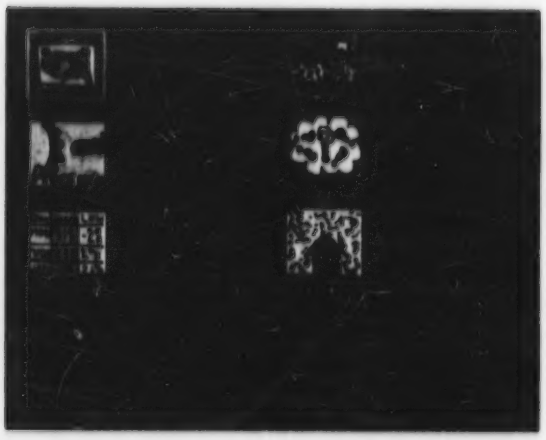

CLOUDS
We are Amy and Drew and our fifth grade class is studying weather. We are studying clouds. There are three types of clouds - cirrus, cumulus, and stratus. Our Web pages include information about these clouds - their features, what type of weather they bring, and where they are located in the sky. Click on the following clouds pictures to learn about them!
CIRRUS CLOUDS
CUMULUS CLOUDS
QUIZ





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Weather Maps
[redacted] to Samantha and Lauren's page. We will be telling you about weather maps. If you want to find out more about weather maps and their symbols, then click on the weather map icon below.
[redacted]
We would love to hear what you think about our web site. You can e-mail our teacher at

The complete Weather Wizards site can be located at the following address: http://curry.edschool.virginia.edu/~sah9y/weather/weatherhome.html. This address is subject to change, however, so it is also accessible from the Crozet Elementary School home page. This page is accessible from Web66 (http://www.web66.com) by navigating to Albemarle County, Virginia and then to Crozet Elementary School.

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Appendix C: Interview Questions for Participating Students

Internet and WWW

1. After this project, how do you feel about your knowledge of the Internet? How do you feel about using the terminology associated with the Internet (e-mail, server, Internet vs. WWW)?
2. Explain how the WWW can be used for educational purposes. Give examples.
3. Was the WWW accessible and why? (scale from 1-10) Specifically, what parts were difficult?
4. When conducting a search on the WWW, do you feel that you are able to efficiently find the information that you are looking for? Why or why not? Give a specific example.

Claris Home Page

5. What do you think were the strengths and weaknesses of Claris Home Page?
   a. Was Claris Home Page in general easy for you to use or difficult? What specifically was difficult for you? Give examples.
   b. Was our instruction about Claris Home Page clear to you? What did you need more help on?
   c. What would you have liked to learn more about (e.g. graphic converter, scanner, etc.)?

Storyboards

6. Tell me about the week you all put the storyboards together (surprises, problems?)

Cooperative Environment

7. How would you describe the cooperative environment for this project? Were there any problems that arose from working with a partner? Give specific examples.
8. How would you define your teacher's role in this project?

How would you define our role in this project?

Evaluation of the Site

9. How do you think the project went?

a. Did you have fun? What parts were fun? What parts were not fun?

b. How would you grade this project?

10. In what ways is the technology part of this experience different from other learning experiences? How is it similar?

11. How did this project help you to better understand what you were learning about weather in class?

12. Why/how do you think other students will learn from your web site? Would you like to have access to other web sites similar to yours?

13. Would you like to continue building this site and/or to build another site as a class?

Extension

14. How do you feel about teaching your classmates how to make web sites?

15. If you had more time to work on this project, what would you differently?

Appendix D: Interview Questions for Inservice Teachers

Collaboration Within TIP

1. We define the purpose of this project as: building a student-centered web site that's grounded in the 5th grade curriculum. The act of building the site in conjunction with classroom instruction was meant to enrich and extend the curriculum. How would you define the purpose? Do you think it was met?
2. What did you want your students to learn from this project?
3. Was the communication between TIP students and yourself sufficient in planning the project?
4. Do you think the project was defined clearly enough before instruction began? Specifically, what was unclear?
5. How would you define your role in this project? Our role? Students' role?

The Project

6. Did this project enrich the curriculum for the eight students that participated? What feedback (from students) did you get that supports your answer?
7. Was this project disruptive to your schedule?
8. How would you evaluate the effectiveness of using the storyboard as a graphic organizer? Do you feel the students made good use of it?
9. Tell us what happened the week we were gone and give us some of your reflections. How was storyboard instruction structured that week? Did the students use the guidelines (posters) given to them to help design their storyboards?
10. After looking at the site, does it meet your expectations? Why or why not?

a. Was the product what you wanted it to be? (content, design)

b. Would you consider it a useful resource? If yes, how?

11. How did you perceive the cooperative learning environment among the students? What is your prior experience with cooperative learning? Why did you structure the pairs the way you did?

Extension of Project

12. How would you assess a student-built project like this in the classroom?

13. How would you structure the instruction for this type of technology project?

14. Do you feel confident enough in your skills to teach your students how to build web sites?

15. Would you like to continue building this site and/or to build another site as a class?

16. Why/how do you think other students will learn from your web site? Would you like to have access to other web sites similar to yours?

17. If you had more time to work on this project, what would you do differently?